Overweight and Obesity in Sexual-Minority Women: Evidence From Population-Based Data

Ulrike Boehmer, PhD, Deborah J. Bowen, PhD, Greta R. Bauer, PhD

Objective. We sought to determine whether lesbians have higher rates of overweight and obesity than women of other sexual orientations.

Methods. We compared population estimates of overweight and obesity across sexual orientation groups, using data from the 2002 National Survey of Family Growth.

Results. Adjusted multinomial logistic regression analyses showed lesbians have more than twice the odds of overweight (odds ratio [OR] = 2.69; 95% confidence interval [CI] = 1.40, 5.18) and obesity (OR = 2.47; 95% CI = 1.19, 5.09) as heterosexual women. Bisexuals and women who reported their sexual orientation as "something else" (besides heterosexual, lesbian, or bisexual) showed no such increase in the odds of overweight and obesity.

Conclusions. Lesbian women have a higher prevalence of overweight and obesity than all other female sexual orientation groups. This finding suggests that lesbians are at greater risk for morbidity and mortality linked to overweight and obesity. This finding also highlights the need for interventions within this population. (*Am J Public Health.* 2007;97:1134–1140. doi:10.2105/AJPH.2006.088419)

Obesity has reached epidemic proportions in the United States.[1,2] *Healthy People 2010* identified obesity and overweight as an important public health concern, and a reduction in the rate of overweight and obesity is 1 of the 10 leading health indicators.[1] The causes of obesity are still not entirely understood. This chronic disease is linked to complex social, behavioral, cultural, physiological, metabolic, and genetic factors.[3] Previous research efforts have not considered sexual orientation as a possible risk factor for obesity, despite evidence that suggests lesbians have higher rates of overweight and obesity.[4–8]

The reasons for lesbians' overweight and obesity have not been thoroughly explored.[9] Studies suggest that differences in obesity rates by sexual orientation may be because of the variance in social, behavioral, and cultural norms by sexual orientation groups. It has been suggested that lesbians are less likely to consider themselves overweight compared with women in the general population.[5] A few studies, using convenience samples, explored the unique factors that may contribute to overweight and obesity in lesbians.[9–11] The results of these studies indicate that lesbian women have a better body image than do heterosexual women and prioritize a body image on the basis of physical function.[12–16] The evidence is inconclusive regarding lesbians' exercise behaviors. It has been argued that lesbians are heavier, but more physically fit, because of their level of physical activity.[6,17] One study has disputed that lesbians' exercise behavior explains their greater body mass index (BMI).[10] Other studies have emphasized that lesbians' exercise behavior is not motivated by aesthetic reasons.[12,15,18] Although these smaller studies provide possible explanatory factors regarding obesity in lesbians, they do not adequately consider covariates shown in the literature to be risk factors for overweight and obesity.

For women in the US general population, the correlates of obesity are increasing age, low education, or low economic status.[2,19–21] Black and Hispanic women have higher rates of overweight and obesity than do White women.[2,22–24] Among White, Black, and Hispanic women, childbearing has been linked to weight gain.[25–29] Nativity has also been identified as a correlate of excess body fat: immigrants tend to have a lower BMI; however, this health advantage disappears as the length of residence in the United States increases.[30–36]

Existing treatments and interventions focus on reducing energy intake by changing nutritional habits and increasing physical activity.[37] Because obesity is particularly prevalent in Black and Hispanic women, several interventions have targeted these specific groups.[38–40] By comparison, there are no interventions that target sexual-minority women. Whether a need for interventions that specifically target sexual-minority women exists depends on the confirmation that lesbians have a higher prevalence of overweight and obesity compared with other sexual orientation groups.

We used population-based data to test the hypothesis that lesbians have higher rates of overweight and obesity compared with women of other sexual orientations. We have responded to the call for population-based studies to determine health disparities that was issued in the Institute of Medicine's *Report on Lesbian Health*[41] and in the *Healthy People 2010 Companion Document for Lesbian, Gay, Bisexual and Transgender (LGBT) Health.*[42]

METHODS

Data

We used data from Cycle 6 of the National Survey of Family Growth (NSFG). This population-based survey was conducted by the National Center for Health Statistics to estimate fertility, marriage and cohabitation, contraception, pregnancy outcomes, and other factors that influence US families. The NSFG survey sample represents the civilian noninstitutionalized population of the United States between the ages of 15 and 44 years. Cycle 6 of the NSFG was conducted in 2002 and included data from in-home interviews with 7643 women. Most of the survey was administered using computer-assisted personal interviewing. The most sensitive questions were answered using audio computer-assisted

self-interviewing. More detailed information on data availability and NSFG planning and conduct is available at the NSFG Web site (http://www.cdc.gov/nchs/nsfg.htm).

Our study sample consisted of 5979 of the 7643 women who completed the survey. Respondents were excluded if they were pregnant or younger than 20 years, because in these groups, BMI is not considered to be appropriate to measure obesity and overweight (n=1585). Another 79 respondents were excluded: 43 refused to answer the question about sexual orientation (0.7%) and 36 reported "don't know" in response to the sexual orientation question (0.6%).

Measures

Our outcome of interest was BMI, a measure commonly used to determine overweight or obesity in nonpregnant adults. BMI (weight in kilograms divided by height, in meters squared) was calculated using respondents' self-reported weight and height (kg/m^2). BMI is not considered appropriate for adolescents aged 15–19 years or pregnant women, so the measure has only been computed for nonpregnant women aged 20–44 years. BMI was coded both as a continuous measure and as a categorical variable that discerned the overweight (BMI 25 kg/m^2–29.9 kg/m^2) and obese (BMI≥30 kg/m^2) from those in a normal or low weight range (BMI<25 kg/m^2).[3]

For the first time in 2002, the Cycle 6 NSFG data included questions about respondents' sexual orientation. Respondents self-identified as heterosexual, homosexual, bisexual, or "something else." The response "something else" was consistent with the answer choices for the sexual identity question in the National Health and Social Life Survey.[43] In our study, we defined lesbians as all women who self-reported a homosexual identity in the NSFG survey.

In addition to sexual identity, our analyses considered covariates previously demonstrated or suggested to be associated with BMI, overweight, or obesity.[2,19–36] These included age, which we categorized into groups to be consistent with the presentation of results from other national surveys (e.g., National Health and Nutrition Examination Survey), and race/ethnicity, which we categorized into Hispanic, White non-Hispanic, Black non-Hispanic, or other. Other race/ethnicity referred to respondents who reported a race other than those listed as well as individuals who reported more than 1 race or ethnicity. We categorized respondents' education into less than high school, completed high school or GED, some college, and college or advanced degree. Respondents' combined household income was measured relative to the 2001 poverty levels for a household of their size, as defined by the US Census Bureau. We categorized this variable into 0%–99% of the federal poverty level to capture the poor, 100%–299% to capture the working poor, and 300% of poverty or more for the nonpoor. Respondents' health insurance status differentiated between no insurance at all, private health insurance plan, Medicaid, and public health insurance coverage (i.e., government, state, military health care). Respondents' place of residence was grouped into areas that had been classified as central city metropolitan statistical areas (MSAs), other MSAs, and non-MSAs. Nativity was distinguished between US-born respondents and foreign-born respondents. When respondents refused or reported "don't know," we recoded these responses as missing. From respondents' reports of number of live births, we derived a dichotomous variable of parity differentiating between null parity and parity.

Analysis

The NSFG was conducted using complex sampling, and thus, analyses must account for stratification, clustering, and unequal weighting. All proportions and means presented were weighted to provide estimates for the US population of noninstitutionalized women aged 20–44 years. The Tayler series approximation technique, which takes into account this complex sampling design, was used to calculate variances for descriptive statistics and in hypothesis testing. We examined differences in sociodemographic characteristics and parity across sexual orientation groups and presented means, frequencies, and 95% confidence intervals (CIs). For hypothesis testing, we used the Rao-Scott χ^2 test for categorical variables and the F-test for continuous variables. Means of BMIs and frequencies of normal weight, overweight, and obesity among the different sexual orientation groups were similarly compared. We conducted multinomial logistic regression analyses to examine sexual orientation differences in the likelihood of being overweight or obese. Our criterion for retention of variables within the model was statistical significance at $\alpha=0.05$ for each individual variable or categorical grouping of dummy variables, or a resulting change of 10% or greater in the natural logarithm (odds ratio [OR]) for the associations between sexual orientation groups and overweight or obesity. Significance was assessed using the Wald χ^2 test. All analyses were conducted using SAS 9.1.3 (SAS Institute Inc, Cary, NC).

RESULTS

Table 1 displays characteristics of the US female population aged 20–44 years by sexual orientation. The sexual orientation groups significantly differ from each other with respect to all demographic characteristics and parity. However, when age is categorized, there were no significant differences between sexual orientation groups. To further explore these differences, we performed a series of pairwise tests and compared each sexual orientation group with the reference group of heterosexual women. Lesbians significantly differ from heterosexual women with respect to parity and their racial and ethnic background. Bisexual women significantly differ from the reference group on age, parity, insurance status, place of residence, and nativity. Women who identified as "something else" differed from heterosexual women on parity and all demographic characteristics with the exception of age.

Table 2 displays population-based prevalence estimates of overweight and obesity in the US population by sexual orientation group and the mean BMI by sexual orientation group. Initially, statistical tests of overweight and obesity indicated that sexual orientation groups were significantly different from each other, but there were no significant differences in the mean BMI by sexual orientation group. We then conducted a series of pairwise tests to compare each sexual orientation group to the reference group of heterosexual women on overweight and obesity prevalence and

TABLE 1—Sample Characteristics of Nonpregnant US Women (N = 5979) Aged 20–44 Years, by Sexual Orientation: National Survey of Family Growth, United States, 2002

Characteristic	Sexual Orientation[a]				*P* (Pairwise Testings)[b]
	Heterosexual (n = 5460; 92.5%), Mean % (95% CI)	Lesbian (n = 87; 1.4%), Mean % (95% CI)	Bisexual (n = 180; 2.5%), Mean % (95% CI)	Other (n = 252; 3.6%), Mean % (95% CI)	
Mean age	32.68 (32.26, 33.10)	33.40 (31.74, 35.05)	30.51 (29.14, 31.87)	32.90 (31.65, 34.14)	.011 (B = .004)
Age, y					.142 (B = .022)
20–29	35.7 (33.2, 35.1)	31.7 (21.2, 42.2)	46.0 (36.6, 55.2)	33.7 (26.9, 40.5)	
30–39	40.9 (38.9, 43.0)	48.0 (35.5, 60.6)	39.8 (30.9, 48.8)	39.1 (31.9, 46.3)	
40–44	23.4 (21.3, 25.6)	20.3 (8.3, 32.4)	14.1 (8.0, 20.3)	27.2 (19.7, 34.7)	
Parity					<.001 (L<.001; B<.001; O<.001)
Nulliparous	31.7 (29.4, 34.0)	64.0 (51.4, 76.7)	51.8 (42.6, 60.9)	20.4 (14.5, 26.4)	
Parous	68.3 (66.0, 70.6)	36.0 (23.3, 48.6)	48.2 (39.1, 57.4)	79.6 (73.6, 85.5)	
Race/ethnicity					<.001 (L = .039; O < .001)
Hispanic	13.8 (12.5, 15.1)	8.5 (2.4, 14.7)	8.1 (4.2, 12.0)	24.9 (18.0, 31.8)	
White, non-Hispanic	68.2 (65.9, 70.4)	62.8 (50.4, 75.3)	67.9 (60.3, 75.5)	42.5 (34.7, 50.4)	
Black, non-Hispanic	13.0 (11.5, 14.5)	17.0 (8.1, 25.9)	15.5 (9.3, 21.7)	26.1 (19.7, 32.6)	
Other	5.1 (4.1, 6.1)	11.6 (3.5, 19.8)	8.5 (3.9, 13.1)	6.4 (3.3, 9.5)	
Medical insurance status					<.001 (B < .001; O < .001)
None	15.6 (14.3, 17.0)	11.4 (5.6, 17.1)	28.2 (19.2, 37.3)	23.5 (16.2, 30.9)	
Private	71.1 (69.5, 72.8)	71.3 (60.5, 82.2)	55.7 (46.1, 65.3)	35.7 (28.0, 43.4)	
Medicaid	7.9 (7.1, 8.7)	7.0 (2.2, 11.8)	9.4 (5.2, 13.7)	26.9 (20.0, 33.7)	
Public[c]	5.4 (4.3, 6.5)	10.3 (2.7, 18.0)	6.6 (2.6, 10.6)	13.9 (8.6, 19.2)	
Residence					<.001 (B = .003; O = .004)
MSA City	50.2 (46.3, 54.1)	48.6 (34.9, 62.3)	42.8 (32.3, 53.3)	34.0 (25.6, 42.4)	
Other MSA	32.8 (28.7, 36.8)	41.0 (27.4, 54.6)	47.2 (36.0, 58.4)	42.1 (32.8, 51.4)	
No MSA	17.0 (15.1, 19.0)	10.4 (1.6, 19.3)	9.9 (4.1, 15.8)	23.9 (16.5, 31.3)	
Nativity					<.004 (B = .025; O = .002)
US-born	85.7 (84.3, 87.1)	83.7 (74.3, 93.2)	90.9 (87.1, 94.7)	77.8 (71.8, 83.9)	
Foreign-born	14.3 (12.9, 15.7)	16.3 (6.8, 25.7)	9.1 (5.3, 12.9)	22.2 (16.1, 28.2)	
Education					<.001 (O < .001)
Some high school	10.5 (9.4, 11.6)	4.8 (0.0, 9.6)	10.7 (4.0, 17.3)	34.5 (26.8, 42.2)	
High school diploma or GED	28.5 (26.8, 30.3)	32.0 (20.8, 43.1)	35.4 (25.7, 45.2)	42.5 (35.0, 50.0)	
Some college	24.5 (22.6, 26.3)	23.9 (12.4, 35.3)	29.1 (20.4, 37.8)	14.7 (10.3, 19.0)	
College degree or graduate school	36.5 (34.2, 38.8)	39.3 (25.3, 53.4)	24.8 (16.6, 33.0)	8.4 (4.7, 12.1)	
Household income, % of the federal poverty level					<.001 (O < .001)
0–99	16.6 (15.0, 18.1)	13.0 (4.2, 21.8)	22.9 (15.6, 30.2)	37.9 (30.9, 44.9)	
100–299	38.0 (36.2, 39.7)	38.9 (27.0, 50.8)	38.6 (29.9, 47.3)	43.6 (36.6, 50.5)	
≥300	45.5 (43.4, 47.5)	48.1 (35.0, 61.1)	38.5 (29.3, 47.7)	18.5 (13.0, 24.1)	

Note. B = bisexual; CI = confidence interval; O = other; GED = general equivalency diploma; L = lesbian; MSA = metropolitan statistical area.
[a]Sample sizes are unweighted. Percentages may add up to more than 100 because of rounding.
[b]*P* values were determined using the Rao-Scott χ^2 test or the F test. Pairwise tests were for comparison of each sexual orientation category to the reference group (heterosexual).
[c]Public medical insurance is defined as state, federal, or military coverage.

mean BMI. Lesbian women were the only sexual orientation group that was found to be significantly different from heterosexual women with respect to overweight and obesity. When we compared the different sexual orientation groups to heterosexual women's mean BMI, lesbian women's higher mean BMI approached significance.

Table 3 presents the results of the unadjusted and adjusted multinomial logistic regression models. The unadjusted results show that lesbian women were the only

TABLE 2—Mean BMI and Prevalence of Overweight and Obesity in Sample of Nonpregnant US Women Aged 20–44 Years, by Sexual Orientation: National Survey of Family Growth, United States, 2002

	Sexual Orientation				
Weight[a]	Heterosexual Mean (95% CI)	Lesbian Mean (95% CI)	Bisexual Mean (95% CI)	Other Mean (95% CI)	*P* (Pairwise Testings)[b]
Normal, no.	49.7 (47.3, 52.1)	30.5 (18.3, 42.7)	48.5 (39.3, 57.7)	41.9 (34.0, 49.8)	.028 (L = .014)
Overweight, no.	25.6 (24.0, 27.2)	35.3 (23.7, 47.0)	29.6 (20.6, 38.6)	31.1 (23.5, 38.6)	
Obese, no.	24.7 (22.7, 26.7)	34.2 (21.3, 47.2)	21.9 (14.8, 29.0)	27.1 (20.7, 33.4)	
Mean BMI	26.1 (25.8, 26.4)	27.6 (26.1, 29.2)	26.2 (25.4, 27.1)	26.7 (25.8, 27.5)	.160 (L = .065)

Note: BMI = body mass index; CI = confidence interval; L = lesbian.
[a]Normal weight is defined as BMI < 25 kg/m^2, overweight as BMI = 25–29 kg/m^2, and obese as BMI ≥ 30 kg/m^2.
[b]*P* values were determined using the Rao-Scott χ^2 test or the F test. Pairwise tests were for comparison of each sexual orientation category to the reference group (heterosexual).

sexual orientation group that was significantly different from heterosexual women with regard to overweight or obesity. Lesbian women were more likely to be overweight (OR=2.25; 95% [CI]=1.22, 4.16) and more likely to be obese (OR=2.25; 95% CI=1.12, 4.53) compared with heterosexual women. Even after adjustment for demographic characteristics and parity, this pattern continued. Lesbian women remained the only sexual orientation group significantly different from heterosexual women in that they had higher odds of being overweight (OR=2.69; 95% CI=1.40, 5.18) and obese (OR=2.47; 95% CI=1.19, 5.09).

In the same model, women were more likely to be overweight or obese if they were older, had parity, were Black, or were Hispanic, than were women who were younger, had null parity, and were White. Being foreign-born, rather than US-born, reduced the likelihood of overweight and obesity. Women at increased risk of obesity had Medicaid rather than private insurance and lived in non-MSAs. Women who have an advanced educational degree were less likely to be obese than were women who had only a high-school education. Finally, the working poor whose income was 100%–299% of the federal poverty level had a greater likelihood of being overweight than the poor. To explore further the observation that differences in overweight and obesity appeared to increase with age, we tested for an interaction of age and sexual identity in our model; it was not significant.

In additional analyses, we regressed BMI on sexual orientation and conducted multiple regression analyses that adjusted for all demographic variables, parity, and economic characteristics (results not shown). Lesbian identity had a positive association with BMI, but in the full model, only approaches significance after adjusting for all other factors (*P*=.051).

DISCUSSION

To our knowledge, this is the first national population-based study to test the hypothesis that lesbian women have a greater likelihood of being overweight and obese. We have confirmed this hypothesis for the US women aged 20–44 years. Our findings indicate that lesbian sexual identity is linked to a greater prevalence of overweight and obesity, even after adjusting for covariates that are shown in the literature to be risk factors for overweight and obesity. Our study substantiates the evidence generated by earlier nonpopulation-based snowball and cohort studies that brought attention to the prevalence of this health problem in the lesbian population.[4–8] In this way, our study is one more example of sexual minority research, where a methodologically sound probability study echoes the findings of earlier studies that were limited in their methodology.[44]

Earlier studies used the same categorization of BMI into overweight and obese and the mean BMI[4,6,7] for comparisons of sexual orientation groups. Several previous studies, however, concluded that lesbian women were more likely to be overweight and obese on the basis of a dichotomous classification of BMI that was consistent with the Third National Health and Nutrition Examination Survey, which coded women who had a BMI of 27.3 or above as overweight and obese.[5,6,8] When we used this dichotomous classification of BMI and made pairwise comparisons to the reference group of heterosexual women, only those in the lesbian group had marginally significant higher levels of being overweight and obese, similar to our findings for mean BMI in Table 2.

The measurement of sexual orientation used by the NSFG resulted in a comparatively large group of women who reported as "something else." Because of its size, we questioned whether this group had influenced our findings. When we replicated our analyses after excluding the women in this group, our finding that lesbian sexual orientation significantly increased the likelihood of overweight and obesity was confirmed. Future research is needed to better identify the sexual orientation of women in this group by offering them a choice to self-label. Additional information on how this group describes their sexual orientation will benefit efforts to improve the measurement of sexual orientation in general.

Future studies and intervention research on weight reduction for sexual-minority women might want to consider assessing women's partner choice. For instance, it has been suggested that bisexual women's physical appearance is influenced by having a male versus a female partner.[45] Limitations of our data prevented us from exploring whether bisexual women and women who reported their identity as "something else" who have a regular female partner are at risk of being overweight and obese. It will be for future studies to determine whether it is sexual identity or choosing a female partner that puts women at risk for overweight and obesity.

We considered many of the factors linked to overweight and obesity in previous studies of women.[2] We concluded that lesbian sexual identity remains a significant predictor of overweight and obesity. Because we used secondary data, we were restricted in our ability to explore risk factors that may be especially

TABLE 3—Associations Between Sexual Orientation Identity and Overweight or Obesity in Sample of Nonpregnant US Women Aged 20–44 Years: National Survey of Family Growth, United States, 2002

	Unadjusted Model OR (95% CI)		Adjusted Model OR (95% CI)	
	Overweight	Obese	Overweight	Obese
Sexual orientation				
Heterosexual	1.0	1.0	1.0	1.0
Lesbian	2.25 (1.22, 4.16)	2.25 (1.12, 4.53)	2.69 (1.40, 5.18)	2.47 (1.19, 5.09)
Bisexual	1.19 (0.76, 1.85)	0.91 (0.59, 1.40)	1.38 (0.85, 2.24)	0.92 (0.58, 1.48)
Other	1.44 (0.98, 2.13)	1.30 (0.91, 1.86)	1.13 (0.73, 1.73)	0.82 (0.54, 1.23)
Age, per year			1.03 (1.02, 1.04)	1.05 (1.03, 1.06)
Parity (parous)			1.34 (1.11, 1.62)	0.99 (0.80, 1.22)
Race/ethnicity				
White, non-Hispanic			1.0	1.0
Hispanic			2.36 (1.85, 3.00)	2.07 (1.55, 2.78)
Black, non-Hispanic			2.19 (1.79, 2.69)	2.65 (2.08, 3.38)
Other			0.99 (0.60, 1.63)	0.97 (0.59, 1.60)
Residence				
MSA city			1.0	1.0
Other MSA			0.95 (0.79, 1.14)	1.03 (0.84, 1.28)
No MSA			1.15 (093, 1.42)	1.61 (1.16, 2.24)
Foreign nativity			0.64 (0.51, 0.81)	0.37 (0.26, 0.51)
Education				
Some high school			1.18 (0.89, 1.57)	0.98 (0.72, 1.33)
High school diploma or GED			1.0	1.0
Some college			0.88 (0.68, 1.13)	0.90 (0.69, 1.19)
College degree or graduate school			0.86 (0.68, 1.08)	0.63 (0.48, 0.84)
Insurance				
Private			1.0	1.0
Public[a]			0.90 (0.63, 1.28)	1.05 (0.73, 1.52)
Medicaid			1.12 (0.83, 1.51)	1.60 (1.17, 2.19)
None			1.03 (0.81, 1.31)	1.12 (0.86, 1.48)
Household income, % of the federal poverty level				
0–99			1.0	1.0
100–299			1.29 (1.02, 1.64)	1.10 (0.86, 1.41)
≥300%			1.20 (0.93, 1.54)	0.77 (0.57, 1.05)

Note: OR = odds ratio; CI = confidence interval; MSA = metropolitan statistical area; GED = general equivalence diploma. 1 signals the reference group for each variable. Reference group is normal or low weight (BMI < 25 kg/m^2). Overweight is defined as 25 kg/m^2 ≤ BMI < 30 kg/m^2, and obese as BMI ≥ 30 kg/m^2.
[a]Public insurance is defined as state, federal, or military coverage.

pertinent to the lesbian population. A review of obesity issues in sexual-minority women identified a number of factors that may be related to obesity in this group of women. These include patterns of eating disorders, body image, reasons for exercising, and perceptions about the value and meaning of weight control.[9] Access to information regarding these factors would have increased our ability to potentially explain the differences in overweight and obesity that we observed during this study. In particular, the inclusion of information on physical activity may have also addressed a known limitation of BMI, which can overestimate body fat in persons who are very muscular and underestimate body fat in persons who have lost muscle mass.[2] Thus, increased muscularity because of exercise may result in the classification of women with high muscle mass and normal body fat as overweight. However, it is unlikely to result in classification as obese. We reported greater odds of both overweight and obesity in lesbians, and we feel confident in asserting that these differences are a result of increased adiposity and not merely higher levels of physical activity such as those noted in studies that considered lesbians' exercise behavior.[6]

Several limitations must be considered when interpreting the results of this study. Our findings apply to a cohort aged 20–44 years. This is a disadvantage because overweight and obesity increases with age until 60 years, after which time a decline in prevalence is observed.[2] Some of the earlier non–population-based studies that demonstrated lesbians' higher rates of overweight and obesity examined an older cohort. In a study by Case et al., 55.8% of the lesbians were 41 years of age and older.[4] In a study by Valanis et al., "lifetime lesbians" (women who have only ever had sexual intercourse with other women) had a mean of 59.4 years of age, and "adult lesbians" (women who have had sexual intercourse with women after age 45 years) a mean of 56.7 years of age.[8] In our study, the mean age of the self-identified lesbian women was 33.4 years of age. Our insignificant interaction term for a test of whether the association between lesbian identity and overweight or obesity was modified by age was limited by the small sample size of lesbians in the NSFG and the reduction in power that occurs with analysis of interaction. In addition to the limitations of the small sample size, the cross-sectional nature of the data also prevented us from determining unequivocally whether lesbians are more overweight and obese at all ages and if the differences between lesbians' and other women's weight increase with age. Future studies including larger numbers of sexual-minority women through oversampling may be useful.

Another limitation of this study was that we were limited in our analytic choices by the small sample size of the lesbian group. In particular, stratified analyses by sexual orientation and age were not possible because of the limited power. Most likely, the absence of

a significant interaction between age and lesbian identity has been influenced by the loss in power. It will be important for future population-based studies that include a bigger sample of lesbian women to improve on the precision of our estimates because the corresponding tests will have better power than we had.

Despite these limitations, our use of these population-based data was of great relevance. We provide rigorous evidence that lesbian women are an at-risk population for overweight and obesity, and thus, for negative health outcomes secondary to obesity. Overweight and obesity are recognized as a cause of preventable deaths,[46–48] although recent findings link only obesity, not overweight, to excess deaths.[49] Other negative implications of obesity and overweight are the substantially increased risk of morbidity from hypertension; dyslipidemia; type 2 diabetes; coronary heart disease; stroke; gallbladder disease; osteoarthritis; sleep apnea and respiratory problems; and endometrial, breast, prostate, and colon cancers.[3]

We conclude from our findings an urgent need for weight-reduction interventions that target the high-risk group of sexual-minority women. At present, the targets of such interventions should be women who identify as lesbian, rather than bisexual women or women who report identifying as "something else." We prove the need for weight reduction interventions in this population, but do not provide specific information for the development of culturally appropriate interventions for this population. For the time being, one can use published differences between lesbians and other women in social, behavioral, and cultural norms that affect overweight and obesity[18,50] to develop a culturally appropriate intervention for lesbians. ■

About the Authors

Ulrike Boehmer is with the Department of Social and Behavioral Sciences, Boston University, Boston, Mass. Deborah J. Bowen is with the Boston University School of Public Health, Boston. Greta R. Bauer is with the Department of Epidemiology and Biostatistics, University of Western Ontario, London, Ontario.

Requests for reprints should be sent to Ulrike Boehmer, Boston University, Department of Social and Behavioral Sciences, 715 Albany Street, T2W Boston, MA 02118 (e-mail: boehmer@bu.edu).

This article was accepted August 29, 2006.

Contributors

U. Boehmer originated the study, completed the analyses, and led the writing. D.J. Bowen provided conceptual input and helped to interpret the findings. G.R. Bauer provided statistical expertise to the analysis and helped to interpret the findings. All authors contributed in significant ways to the final article by reviewing and discussing earlier drafts.

Human Participant Protection

The institutional review board at Boston University determined that this study was exempt because it did not meet the definition of human subject research. U.B. and G.B. entered into a user agreement with the National Center for Health Statistics for access to the data.

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